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ABSTRACT

This study was designed to determine whether or not students assigned to remedial reading courses at Queensborough Community College were actually improving their reading skills. Students (1,543) who scored below 33% on the Reading Comprehension Subtest of the Cooperative English Test (COOP) were divided into four classes of ascending ability and two mixed classes. At the end of the semester all were post-tested using the same test. Scores were compared in vocabulary, level of comprehension, speed, and total reading. Mean scores for each class increased significantly in all four variables. Analysis of variance tests showed the groups to be distinctive from each other, and significantly different on each variable. Students at each reading level progressed on the post-test to the level of the pre-test of the next highest group. A comparison of final grades and the COOP post-test showed more agreement in classes of higher reading ability; 32% of those in the highest group failed COOP, and .6% of that group failed the course, while 77.6% of the lowest group failed COOP, and 33.3% of that group failed the course. Overall, 40.2% reached an acceptable reading level according to COOP, but final grades yielded a success rate of 86.9%. Tukey multiple comparison tests on pre- and post-test scores and frequency tables for the four reading levels are appended. (RT)

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A STUDY OF REMEDIAL READING COURSES (BE-03) OFFERED DURING THE FALL, 1972 SEMESTER: A BASELINE FOR LONGITUDINAL STUDIES

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JC 770 466

OFFICE OF TESTING, EVALUATION AND EDUCATIONAL RESEARCH

QUEENSBOROUGH COMMUNITY COLLEGE

THE CITY UNIVERSITY OF NEW YORK

1973

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Queensborough Community College (QCC)
The City University of New York (CUNY)

Office of Testing, Evaluation and
Educational Research

A Study of Remedial Reading Courses (BE-03) Offered During the Fall, 1972 Semester: A Baseline for Longitudinal Studies

The Background and Context of this Study

This study is the first of a series of studies in the master research plan currently being conducted by the Office of Testing, Evaluation and Educational Research at Queensborough Community College, (QCC) to determine whether remedial courses in English and Mathematics are making an impact on the academic performance of QCC students. In a still larger context, instruments are currently being designed to determine the effect of the QCC experience on graduates and withdrawals on their educational and/or professional and/or vocational activities after leaving the College. In both of the above spheres, the emphasis will be to develop longitudinal data semester after semester to help determine the effectiveness of our academic programs.

Objectives

Specifically, there are three main objectives within the Master Research Plan concerned with evaluating remedial instruction at the College, namely;

1. To determine whether remedial instruction does, in fact, remove the academic deficiencies of students.
2. To determine whether the procedure using the English and Mathematics Cooperative Tests, (Educational Testing Service: ETS) validly identifies students who truly need English and Mathematics remediation.
3. To determine whether students who show academic deficiencies and successfully complete remedial courses in writing and reading and math do better in regular credit bearing courses than students who show academic deficiencies and do not complete remedial courses.

Rationale for Evaluating Remedial Courses

Table 1 below describes the number of sections and students enrolled in remedial courses from Fall '71 through Fall '73.

With regard to Objectives 1, 2 and 3 to evaluate the effectiveness of remedial courses at the College, it must be borne in mind that out of approximately 2,000 sections taught each regular semester, approximately 250 are

remedial courses. For the Fall '73 Semester, for example, 254 (11.9%) remedial course sections were offered out of a total of 2,137 sections taught at the College.

For 3,450 entering Fall '73 freshmen who took the placement test, 2,134 or 61.9% were required to take remedial reading (BE-03), while 1,421 or 41.2% were required to take remedial writing (BE-01). For non-matriculated students, which represents about one-third of our student body, the results are slightly higher, namely 62.4% and 46%, respectively, for BE-03 and BE-01.

TABLE 1

Remedial Course Enrollment by Section and No. of Students Fall 1971-1973

Remedial Courses	FALL '71 No. of Sections	FALL '71 # of Students	FALL '72 No. of Sections	FALL '72 # of Students	FALL '73 No. of Sections	FALL '73 # of Students
BE-01 (Composition Workshop)	90	1471	91	1417	82	1453
BE-03 (College Reading)	123	1980	128	2321	120	2087
MA-00 (Numerical Skills for College Students)	1	7	2	39	4	98
MA-10 (Basic Math Skills)	25	685	26	686	35	756
MA-20 (Intermediate Mathematics)	12	299	9	250	13	254
TOTALS	251	4442*	256	4713*	254	4648*
COLLEGE TOTALS	N/A	12,813	2033	13,640	2137	14,468
% OF COLLEGE TOTAL	--	34.7	12.6	34.6	11.9	32.1

* These are not necessarily different students since one student may be enrolled in more than one remedial course.

TABLE 1 (continued)

Remedial Course Enrollment by Section and No. of Students Fall, 1971-1973

Remedial Courses	SPRING '72 No. of Sections	SPRING '72 # of Students	SPRING '73 No. of Sections	SPRING '73 # of Students
BE-01	49	835	53	862
BE-03	79	1168	85	1361
MA-00	1	8	1	19
MA-10	19	427	22	536
MA-20	7	145	9	211
TOTALS	155	2583*	170	2989*
COLLEGE TOTALS	1863	11,861	1958	12,894
% OF COLLEGE TOTAL	8.3	21.8	8.7	23.2

* These are not necessarily different students since one student may be enrolled in more than one remedial course.

It should be noted that there are other remedial efforts at the College including tutorial programs in all academic departments which are not in the purview of this study.

It must be emphasized that all of the studies related to objectives 1, 2 and 3 are interdependent elements of the research design. The meaning of the results of the pretest-posttest studies (Objective 1) relies heavily on the validity of the instruments (Objective 2). The results of studies on Objectives 1 and 2 will become more meaningful if it can be determined that academic performance in regular classes depends upon the successful completion of remedial instruction (Objective 3). The study which follows is related to objective one. Studies are already underway which are concerned with Objectives 2 and 3.

Purpose of This Study

The purpose of this study is to determine whether students who have been identified by the Coop English Test procedure, to take remedial reading (BE-03), have, in fact, improved their reading skills after one semester. (See Objective 1)

Subjects

The subjects for this experiment were 1,543 Queensborough Community College (QCC) students who were enrolled in BE-03 during the Fall of 1972. BE-03 is a remedial reading course given at QCC for those who score below the 33rd percentile on the Reading Comprehension Subtest of the Cooperative English Test. Level 1 is the lowest reading group and Level 4 is the highest. There were some classes taught during the day for which the level could not be determined. This group will be referred to as the "mixed level day classes". All evening students were treated as one group since the reading level of these classes was not as distinct as day classes. This group will be referred to as the "mixed level evening classes". In all, there are six groups being considered: the four distinct levels during the day, the mixed day group, and the mixed evening group. The breakdown of students based on Reading Comprehension scores of the Coop English Test is in Table 2 below.

TABLE 2

Number of Students in Study by Level of Reading in BE-03 as Ascertained by the Coop English Test (Reading Comprehension Test)

Level of Remedial Reading Classes (BE-03)	N
Homogeneous Classes by Level of Reading	
Level 1 (lowest reading level)	176
Level 2	409
Level 3	302
Level 4 (highest reading level)	185
Subtotal Day Classes- - - - - - - -	1072
Heterogeneous Classes - Mixed level day classes	143
- Mixed level evening classes	328
Subtotal of Mixed Classes (day and evening) - - - - - -	471
Total	1543

Description of Instrument

The test used was the Reading Comprehension Test of the Cooperative English Test, Form 1A, which comprises 3 subtests, namely, Vocabulary (60 items), Level of Comprehension (30 items), Speed of Comprehension (30 items). Total Reading (120 - all items), yields a fourth score. The three former scores are reported as raw scores (no correction for guessing) and are then changed to converted

scores. Total Reading is the average of converted Vocabulary and Converted Speed of Comprehension scores.

Students are placed in regular English or the BE-03 course based on the Total Reading Score. For borderline cases, the converted vocabulary score is used. See Table 7 for cut-off scores as used in the QCC placement procedure.

Reliability

No test-retest, split half or internal consistency reliability coefficients were reported in the Cooperative English Tests Technical Report (1960) which accompanies this test. This points up the need to conduct reliability studies since it is important to know whether the Coop English test is a stabile measuring instrument.

Validity

It is also important to know whether the Reading Comprehension Test is truly measuring reading ability. All of the validity studies presented in the Technical Report were done on an earlier form of the Reading Comprehension Test and hence cannot be generalized to the form 1A test currently being used. Many validity studies on the Coop English Test have been reported in Buros (1965). However, this does not nullify the need to cross-validate the Coop English Test using Q.C.C. students.

As reported in the Technical Report, the content validity of the test was based on the utilization of well qualified people to construct the tests. The question still remains to determine whether the test has content validity when comparing the BE-03 curriculum and the items of the test. The problem of predictive validity also remains since it is important to know whether there is a relationship between test scores and performance in regular classes.

Both reviewers in Buros Sixth Mental Measurements Yearbook (1965) have recommended the test with certain reservations.

Data Collection

All students enrolled in BE-03 during the Fall of 1972 were posttested in class during the last two weeks of the semester. After receiving the list of those who were posttested, the pretest scores of those students were ascertained. All entering students, with few exceptions, were required to take the Coop English Test as part of the QCC placement test procedure. These scores served as pretest data. All students for whom we had both pre and posttest scores were included in the study. Final grades for BE-03 students in the study were also collected. Reliabil-

ity and validity of final grades are yet to be determined by future studies.

A research design consisting of two major statistical analyses were utilized to determine whether remedial instruction does, in fact, remove the academic deficiencies of students. (Objective 1) Statistical analysis 1 compared means on the Coop English Test while statistical analysis 2 compared pass-fail placements by the Coop English Test with final BE-03 grades.

Statistical Analysis One: A Comparison Among Means on the Coop English Test

Pretest and Posttest means and standard deviations were found for the six groups in the study for the following dependent variables:

1. Vocabulary (raw score)
2. Level of comprehension (raw score)
3. Speed (raw score)
4. Total reading (converted score)

Since each of the parts of the Coop English Test have different numbers of items, the total number correct is not useful in comparing scores. Conversion tables in the Manual for Interpreting Scores (1960) are used to change each raw score to a converted score. Converted scores

are standardized scores which allow one to compare, for example, Vocabulary with Level of Comprehension.

Total Reading is the mean of converted Vocabulary and converted Speed. Therefore, Total Reading must be a converted score.

Limitations of Statistical Analysis One

Statistical Analysis One utilizes a One Group - Pretest - Posttest design. This pre-experimental design contains several sources of internal invalidity which may attenuate the significant difference between pretest and posttest. They are:

1. History: Change-producing events other than the remedial courses may have caused the increase in scores. Required reading in other courses may have improved reading skills.
2. Maturation of the student socially, psychologically or biologically, over the semester.
3. Testing: When taking the Reading Comprehensive Coop English Test twice as both a pretest and posttest, students usually do better for one reason or another the second time.
4. Statistical Regression: Students who have extremely low or high scores generally score

closer to the mean on the second test. Since all students in this study scored low on the pretest and were placed in remedial reading (BE-03), the probability of scoring higher on the posttest is considerably higher. Campbell & Stanley state, "regression effects are thus inevitable accompaniments of imperfect test-retest correlations for groups selected for their extremity" (Campbell & Stanley, 1963, P. 11).

Missing Data from Statistical Analysis One

In all, there were 1543 students for whom we had pre and posttest scores out of about 2300 who were enrolled in the course. There were 50 students for whom pretest scores were not available. It was determined that 183 students withdrew from the course. The Office of Testing only received 120 out of 128 sections back from the Basic Skills Department which accounts for another 80 missing students. This leaves about 350 students unaccounted for and may be attributed in large part to absence during the posttest. This averages out to less then three students absent per class, which is fairly negligible. Therefore, the 1543 students in the study not only made up about 75% of the BE-03 population (N=2321) but seem to the writers to be representative of the entire population.

Pretest-posttest comparisons among means using t-tests were utilized.[1] The results are presented in Tables 3-6 below.

TABLE 3

Pretest and Posttest Means, Standard Deviations and "t" Values of Experimental Groups for the Vocabulary Subtest of Coop English Test Based on Raw Scores
(N=1543)

	Pretest		Posttest			
Level	mean	s.d.	mean	s.d.	n	t
Level 1	16.73	6.71	22.69	7.55	176	9.91*
Level 2	20.89	5.76	25.38	7.29	409	12.10*
Level 3	23.42	5.25	27.57	7.22	302	9.66*
Level 4	26.46	5.65	29.73	5.99	185	6.95*
Day	21.24	7.39	25.48	6.95	143	6.30*
Evening	20.72	9.87	29.92	10.82	328	13.59*

*$p < .01$

As can be seen in Table 3 above, all of the means have increased from the pretest to the posttest on the Vocabulary subtest. The t-ratios are all significant and there is a separation between the four levels on the posttest in the proper direction.

[1]These analyses were performed on an IBM 360/50 computer at CCNY via a terminal at QCC utilizing a computer program written by A. H. Diamond.

As can be seen in Table 4, all of the means have increased from the pretest to the posttest on the Level of Comprehension subtest. The t-ratios are all significant and there is a separation between the four levels on the posttest in the proper direction, though Level 3 and 4 do not seem to be distinct.

TABLE 4

Pretest and Posttest Means, Standard Deviations and "t" Values of Experimental Groups for Level of Comprehension Subtest of the Coop English Test Based on Raw Scores (N=1543)

	Pretest		Posttest			
Level	mean	s.d.	mean	s.d.	n	t
Level 1	11.68	4.13	14.05	5.16	176	5.30*
Level 2	13.31	3.91	15.21	4.17	409	8.20*
Level 3	15.21	3.79	17.13	3.78	302	7.51*
Level 4	16.34	3.27	17.63	3.99	185	4.37*
Day	13.09	4.79	15.53	4.51	143	5.93*
Evening	12.15	5.58	15.73	5.28	328	9.52*

*p < .01

As can be seen in Table 5, all of the means have increased from the pretest to the posttest in the Speed subtest. The t-ratios are all significant and there is a separation between the four levels on the posttest in the proper direction.

TABLE 5

Pretest and Posttest Means, Standard Deviations and "t" Values of Experimental Groups for the Speed subtest of the Coop English Test based on Raw Scores
(N=1543)

	Pretest		Posttest			
Level	mean	s.d.	mean	s.d.	n	t
Level 1	13.99	5.39	19.09	8.86	176	7.37*
Level 2	16.20	5.03	21.38	6.66	409	16.29*
Level 3	19.42	5.25	24.39	7.12	302	11.44*
Level 4	22.43	4.74	26.84	7.16	185	9.10*
Day	16.30	5.83	23.01	8.36	143	10.38*
Evening	14.41	6.96	21.33	7.84	328	15.43*

*$p < .01$

As can be seen in Table 6, all of the means have increased from the pretest to the posttest using Total Reading scores (converted). The t-ratios are all significant and there is a separation between the four levels on the posttest in the proper direction.

TABLE 6

Pretest and Posttest Means, Standard Deviations and "t" Values of Experimental Groups for Total Reading based on Converted Scores of the Coop English Test (N=1543)

	Pretest		Posttest			
Level	mean	s.d.	mean	s.d.	n	t
Level 1	138.86	19.29	147.88	8.67	176	5.83*
Level 2	142.58	19.26	150.72	6.37	409	8.19*
Level 3	146.22	19.26	153.52	6.36	302	6.34*
Level 4	150.52	16.07	156.46	5.52	185	4.89*
Day	138.98	31.94	151.92	7.34	143	4.75*
Evening	132.59	41.86	152.97	8.31	328	8.89*

*$p < .01$

In order for the reader to put the above scores in proper perspective, Table 7 presents the cut-off scores and method of placement into BE-03.

TABLE 7

Cut-off Scores and Rules for Placement into BE-03

%iles**	Converted Total Reading Score*	Placement
0 - 3	122-139	Take BE-03 as a Prerequisite (Level 1)***
3.1 - 10.4	140-145	Take BE-03 as a Prerequisite (Level 2)***
10.5 - 14	146-147	Take BE-03 as a Co-requisite (Level 2)****
14.1 - 23.8	148-151	Take BE-03 as a Co-requisite (Level 3)****
23.9 - 29.8	152-153	Take BE-03 as a Co-requisite (Level 4)****
29.9 - 32.79	154-155	Check Level of Comprehension If 156 or above take EN-11 (English Composition) If 155 or below take BE-03 as Co-Requisite (2) (Level 4)
32.8 or above	156 or above	Take En-11 (English Composition)

*Converted Total Reading is the mean of converted Vocabulary and converted Speed. Note that raw scores of 26 for Vocabulary and 27 for Speed convert to a 156 for Total Reading. However, a higher score on one can compensate for a lower score on the other.

**Percentiles based on normed data on college freshmen (see Coop English Technical Report, ETS, 1960, p.28)

***Prerequisite to English, History and Social Science courses (See QCC Academic Advisement Handbook)

**** Corequisite to English Composition (En-11)

In summary, data in Tables 3-6 are consistent in their results. There is generally a marked and significant increase from pretest to posttest across all four variables. The posttest means still maintain the same ordinal ranks as in the pretest.

Analyses of variance[1] were performed on the four day groups (levels 1-4), separately, for both the pretest and the posttest on each of the four dependent variables in order to determine if the groups were distinct to begin with and distinct after. The results are presented in Tables 8-15. The Tukey multiple comparison test was performed on the means within each analysis of variance for both pretests and posttests using a procedure described by Guilford (1965). The results of the Tukey tests are presented in Appendix A and B. For each one-way analysis of variance, each level was significantly different from every other level in both pretests and posttests, except in one case. (See Appendix B-2) where Level 3 was not significantly different from Level 4 on the posttest.

Table 8 below shows that the four levels are significantly different when comparing Vocabulary means on the pretest.

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[1]These analyses were performed on an I.B.M. 360/50 computer at CCNY via a terminal at QCC utilizing the BMD-01V Statistical program.

TABLE 8

Summary of Analysis of Variance for Vocabulary Means-Pretest (Raw Scores)

Source	S.S.	d.f	M.S.	F	P	ω^2
Between	9,671.46	3	3,223.82	96.40	.01	21.1%
Within	35,716.14	1068	33.44			
Total	45,387.61	1071				

Table 9 below shows that the four levels are significantly different from each other on the pretest on Level of Comprehension means.

Table 9

Summary of Analysis of Variance for Level of Comprehension Means - Pretest (Raw Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	2,587.75	3	862.58	59.20	.01	14%
Within	15,560.93	1068	14.57			
Total	18,148.68	1071				

Table 10 below shows that the four levels are significantly different from each other on the Speed means for the pretest.

TABLE 10

Summary of Analysis of Variance for Speed of Comprehension Means - Pretest (Raw Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	8,345.54	3	2,781.85	106.37	.01	22.8%
Within	27,931.12	1068	26.15			
Total	36,276.65	1071				

Table 11 below shows that the four levels are significantly different from each other on the Total Reading means for the pretest. The results shown in tables 8-11 are not surprising since the Coop English percentiles were used to form the groups. The posttest means for the four levels were compared in order to determine if the four levels were distinctly different at the end of the term. (See Tables 12-15)

TABLE 11

Summary of Analysis of Variance for Total Reading Means-Pretest (Converted Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	14,674.40	3	4,891.46	13.85	.01	3.5%
Within	377,216.56	1068	353.20			
Total	391,890.94	1071				

Table 12 below shows that the four levels are significantly different on the Vocabulary means for the posttest.

TABLE 12

Summary of Analysis of Variance for Vocabulary Means - Posttest (Raw Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	5,302.91	3	1,767.64	34.84	.01	8.6%
Within	54,183.86	1068	50.73			
Total	59,486.77	1071				

Table 13 below shows that the four levels are significantly different on the Level of Comprehension means for the posttest.

TABLE 13

Summary of Analysis of Variance for Level of Comprehension Means - Posttest (Raw Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	1,802.08	3	600.69	33.66	.01	8.4%
Within	19,061.99	1068	17.85			
Total	20,864.08	1071				

Table 14 shows that the four levels are significantly different for the Speed means on the posttest.

TABLE 14

Summary of Analysis of Variance for Speed Means- Posttest (Raw Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	7,039.85	3	2,346.62	44.19	.01	10.8%
Within	56,710.57	1068	53.09			
Total	63,750.43	1071				

Table 15 below shows that the four levels are significantly different on the Total Reading means for the posttest.

TABLE 15

Summary of Analysis of Variance for Total Reading Means - Posttest (Converted Scores)

Source	S.S.	d.f.	M.S.	F	P	ω^2
Between	8,045.32	3	2,681.77	60.07	.01	14.2%
Within	47,675.34	1068	44.64			
Total	55.720.66	1071				

Results of Statistical Analysis One

There were 1,543 students registered in BE-03 who were pre and posttested on the Reading Comprehension Coop English Test during Fall 1972. For the four pre-post comparisons, namely Vocabulary, Level of Comparison, Speed, and Total Reading, t-tests were performed. In every case

the results were significant in a positive direction. The pretest and posttest change for Levels 1 through 4 and the mixed evening and day groups were of considerable magnitude and showed increments between one-half and approximately one whole standard deviation.

The interesting aspect of the data in Tables 3-6 concerns the levels attained by each group at the end of the term. For all four dependent variables, the following statements can be made:

1. Level 1 students generally had post scores at about where the Level 3 students began.
2. Level 2 students had post scores at about where the Level 3 or Level 4 students began.
3. Level 3 students had post scores slightly higher than where the Level 4 students began.
4. The only meaningful statement that can be made about the Level 4 students is that their post Total Reading Scores were high enough so that they would be placed in EN-11.

Table 16 below summarizes these results.

TABLE 16

Summary of Pre-Post levels for BE-03

Initial Level	Final Level
Level 1	Level 3
Level 2	Level 4
Level 3	Above Level 4, but not eligible for EN-11
Level 4	Eligible for EN-11

In general, the mixed level day group looked like a Level 2 group on the Total Reading posttest. However, this result is not too meaningful because there was no way to tell what the initial levels were. The mixed level evening group was between Levels 2 and 3 on the Total Reading posttest.

An important question that can be asked is, "Are the levels working?" Are the students placed in each level different enough from each other to warrant the existence of the levels? A one-way analysis of variance was performed on the pretest data between levels for each dependent variable. (See Tables 8-11) It was found in all cases that the F-ratios were significant. Multiple comparison tests were performed (Tukey) and it was found that for each variable, all the means were significantly different from each other. (See Appendices A and B) This result confirms that the four levels are, <u>on the average</u>, distinct to begin with and is not surprising since data from the Reading Comprehension Coop English Test were utilized to form these groups. In a sense, this validates the placement cut-off scores, since the four levels are significantly different to begin with.

The final postest levels achieved by each group are shown above in Table 16. These results were confirmed by performing a one-way analysis of variance on the postest means. (See Tables 12-15) All of the F's were significant. Multiple comparison tests showed that for each variable, the means were different from each other in all but one case. (See Appendices A and B) This confirms that the final levels achieved were distinct, and coupled with the previous t-test results, shows, in addition, that there was a general and significant upward movement of scores.

Discussion of Statistical Analysis One Results

Since the F-ratios and the t-ratios in Statistical Analysis One were quite high (up to 50 times that which was needed for signficance), the results may be accepted with a certain amount of confidence, but at the same time with certain reservations.

When considering the sources of invalidity previously discussed in Analysis 1, any difference between pretest and posttest scores is questionable. As a result, no definitive conclusions may be drawn regarding the effectiveness of the remedial reading treatment provided in BE-03 since a statistical significance between pretest and posttest may be attributed to variables other than the remedial reading

course (BE-03). However, the consistence of significant differences between pretest and posttest on all four dependent variables did provide some evidence that positive reading gains seem to have been made by students who completed BE-03. It must be emphasized that statistically significant gains in scores do not necessarily mean that reading deficiencies have been removed.

In planned future studies, a pretest-posttest control group design will be utilized which will remove or control, in large part, these sources of invalidity.

When considering the results of Analysis 1 above, it appears that:

1. The cut-off scores used with the Reading Comprehension Coop English Test seems to separate students at the outset into four distinct groups which are in actuality at four quite different reading levels.
2. The BE-03 courses seem to be accomplishing the goal of significantly raising reading ability. It is recommended that no change be made at this time in the procedure of placing students in courses, or the use of reading levels.
3. Since the groups are significantly different on the posttest, it would seem that the levels reached by the four groups are real levels, e.g.,

the final level of the Level 1 students is really the same as the beginning level of the Level 3 students. Based on this fact, the data seem to suggest that:

a. The policy of passing Level 3 and Level 4 students in BE-03 should be retained.

b. The policy of permitting Level 1 and Level 2 students to pass BE-03 should be reviewed. The results indicate that these students would seem to benefit from a second semester of BE-03 and/or other modes of reading instruction. It may very well be that there is a need to introduce other objective data, at this point, to determine whether a student's reading deficiencies have, in fact, been removed.

It now seems logical to analyze the data using frequency tables comparing pass-fail scores on the posttest with final grades for BE-03.

Statistical Analysis Two: A Closer Look at the Data Using Frequency Tables

The Analysis of Variance (ANOVA) statistical information presented in the previous section made comparisons of pretest and posttest means among groups based on reading level using the Reading Comprehension Coop English Test. The means tell us how a group performed on a test on the average. It was previously concluded that Reading level 1 & 2 students seem to require further remedial reading instruction according to the results of the posttest. It is therefore important to take a closer look at these data and determine the exact frequency of the number of students who according to the results of the posttest would have have been placed in BE-03 had it been a placement pretest and then compare these results to final pass-fail grades in the BE-03 course.

Missing Data from Statistical Analysis Two

In the previous section of this study the Reading Comprehension Coop English Test scores of 1543 students were analyzed. In this analysis the number of students accounted for has dropped to 1286, a loss of 275 (21.3%). Final grades for these students were not readily available and hence were not included in this analysis. It has been established that these 275 students were no longer in attendance at the College during the Spring '73 semester,

for a variety of reasons. The writers suspect that this may be a random loss of data, and may not seriously affect the results.

Comparisons Between Final Grades and Posttest Results

An overall comparison of BE-03 posttest results and BE-03 final grades will now be presented in order to determine the separate pass-fail rates for posttest and final grades, as well as to determine the level of agreement between BE-03 final grades and Reading Comprehension posttest placements. In one sense this comparison also yields data on the validity of the test if one considers final grades as a valid predictor. In another sense this comparison yields data on the validity of the final grades if one accepts the test as a valid predictor. Both comparisons, though, require further study.

Table 17 below indicates that out of 1286 students in BE-03, all of whom failed the Reading Comprehension English Coop Placement Test which placed them in the remedial reading course, 517 or 40.2% passed the posttest after one semester of remedial reading. When using final BE-03 final grades as a criterion of success, 1118 or 86.9% passed the remedial course.

It is evident from these data that the process of awarding final pass-fail grades is generally less stringent than the results of the Reading Comprehension Coop English Test. Inspection of Appendix C shows that Levels 1 and 2 contributed the largest number of posttest failures (70%) and thus seems to support the previous mean comparisons which indicated that students in Levels 1 and 2 did not on the average pass BE-03 when using the posttest as a dependent variable. For levels 3 and 4 appendices C-3 and C-4 show that 47.7% and 32% respectively, failed the posttest. Level 4 results are obviously at variance with the previous Analysis of Variance results which placed students out of BE-03 on the average.

TABLE 17

A Fourfold Table of Frequencies Comparing BE-03 Posttest Placement by the Reading Comprehension Coop English Test and BE-03 Final Grades for All Students in BE-03, Fall, 1972 Semester (N=1286)

		BE-03 COOP English Posttest Results		
		Pass	Fail	Total
BE-03 Final Grade	Pass	508 (39.5%)	610 (47.4%)	1118 (86.9%)
	Fail	9 (0.7%)	159 (12.4%)	168 (13.1%)
	Total	517 (40.2%)	769 (59.8%)	1286 (100%)

Table 17 also indicates that for all students in BE-03, there is complete agreement between final BE-03 grades and Coop English posttest placements for 667 students (51.9%), while 619 students (48.1%) have conflicting results. Table 18 also shows that 610 students (47.4%) received passing BE-03 final grades and failed the Coop English test (false positives), while only 9 students (0.7%) failed the remedial reading course (BE-03) and passed the Coop English posttest (false negatives). Since these latter two groups, false positives and false negatives, yield discrepant results, the expectation under the null hypothesis is that one half the cases would fall in one category (false positive) and one half in the other (false negatives). Using the McNemar test for the significance of differences in frequencies for these two groups as described by Siegel, (1956, page 63), it was found that the number of students (N=610) who failed the Coop English posttest and passed the BE-03 course (false positives) was significantly greater than the number of students (N=9) who passed the Coop English posttest and failed the BE-03 course (false negatives). ($\chi^2=583.52$, df=1, $p < .001$)

It seems worthwhile at this point to look at the different reading levels of BE-03 to determine whether the trends reported above are consistent among all four reading level classes.

Inspection of Appendices C-1 through C-4 which shows the pass-fail frequency breakdown for each of the reading levels 1 to 4 indicates general agreement with the overall analysis shown in Table 17 regarding the relationship of false positives to false negatives. In all four levels, the BE-03 Reading Comprehension posttest pass-fail results were significantly more stringent than the final BE-03 grades. The need to determine the validity of the Reading Comprehension Coop test is made more apparent when considering these discrepant results.

Table 18 below also shows that the Reading levels seem to be working and confirms an earlier conclusion. The rate of failure is curvilinear to the reading level according to both the posttest and final grades. The discrepancy between posttest and final grades is again apparent in rates of failure.

TABLE 18

Percent of Failures for Reading Comprehension Coop English Posttest and Final Grades (BE-03) By Level of Reading

Reading Level	% Failed Coop Posttest	% Failed Course (BE-03 Grade)
1 (Lowest)	77.6	33.3
2	72.6	17
3	47.7	7.8
4 (Highest)	32	.6
Mixed (Day)	59.7	12.6
Mixed (Eve.)	59	7.8

Inspection of Table 18 above indicates that the Coop English Test is far more stringent than the instructor's final grades when considering Reading levels. There are twice as many failures produced by the posttest than by final grades for level 1, while the ratios for levels 2, 3 and 4 are respectively 4.3, 6.1, and 53.

Breaking down the overall data from Table 17 into the four reading levels of BE-03, the following percents of agreement between BE-03 final grades and BE-03 English posttest resulted:

Level	% of Agreement
Level 1 (Lowest reading level of BE-03	50.6
Level 2	43.3
Level 3	57.6
Level 4 (highest reading level of BE-03)	68

Discussion of Statistical Analysis Two Results

The above data indicate that for the higher reading levels (3 and 4) there tends to be more agreement between grades and posttest results and for the lower reading levels (1 and 2) there tends to be less agreement. This suggests that the Basic Skills Department should take a closer look at all reading level grading procedures. (See Appendices C-1 through C-4 for frequency breakdown of each reading level.)

In both day and evening, BE-03 classes which were heterogeneous with regard to reading level, the percents of pass-fail agreement between final grades and posttest scores were 52.9 (day) and 48.8 (evening). In both day and evening heterogeneous classes, no students failed the

course and passed the Coop English posttest while 47.1% and 51.2% respectively failed the posttest and passed the course. These results are similar to the results of the four homogeneous reading level classes as well as the overall analysis presented in Table 17.

In summary, these data generally show that when using the Reading Comprehension Coop English test as a criterion measure for the overall group 40.2% reached an acceptable reading level according to the QCC placement testing program, while BE-03 final grades yielded a success rate of 86.9%. These results suggest that a closer look should be taken at both the grading procedure and the validity of the Coop English Test. It is quite possible that if the Coop English Test is not a valid criterion measure, the discrepancies between grading and the Coop Test may be spurious.

When looking at the frequency breakdown by reading level as one moves down from the higher reading level to the lower ones there tends to be less agreement betwen BE-03 final grades and Coop English Test scores. The data suggest that if the Coop English Test is accepted as a valid exit instrument, (and this is yet to be studied), be it content validity and/or predictive validity, the grading procedure should be reviewed and possibly made more objective. To achieve more objective grading requires that specific reading behaviors be further

identified and then measured.

Since the Coop English Test may not be a valid exit instrument, a new criterion-referenced instrument should be developed. It seems that the remedial reading course (BE-03) requires more structure regarding specific agreed upon behavioral objectives for the course. Once the formulation of these measurable objectives is agreed upon and established, the attainment of these goals can be more easily evaluated by a criterion-referenced instrument than by the norm-referenced Coop English test which may or may not measure the new set of objectives. In this scheme, once the predictive validity of the Coop test is determined, and found acceptable, then the Coop test may serve as a valid screening instrument for placing students into BE-03 while the criterion-referenced test should be a more valid instrument to determine whether a student has removed his reading deficiencies and can advance out of the remedial course.

It seems logical to suggest that a procedure which places students into a remedial course to remove deficiencies should also determine more objectively whether these deficiencies have been in fact removed.

It may be that the Basic Educational Skills Dept. would want to consider learning systems which incorporate greater objectivity such as a modular or programmed approach. This will enable the student to achieve explicitly stated behavioral goals at a rate decided upon by both student and faculty. In this arrangement students may remove their academic deficiences in varying periods of time not necessarily confined to a lock step semester system.

Discussion of Results of Statistical Analyses One and Two

In summary of both the univariate pretest-posttest analysis of variance and the frequency of pass-fail scores produced by final BE-03 final grades and the Reading Comprehension Coop English posttests administered at the end of the BE-03 semester the following conclusions are drawn:

1. The BE-03 remedial reading course seems to improve the performance of students in reading comprehension as measured by the Reading Comprehension Coop English test. When a pretest-posttest control group design is used in future studies then this conclusion can be made more definitive.

2. Level 1 and 2 students do not on the average achieve passing scores on the Coop English post-test and seem to require additional instruction in remedial reading. Levels 3 and 4 also require a closer look. A criterion-referenced test or a validation of the current test would determine whether this need is valid for all four levels.
3. Discrepancies between placements made by teacher given final pass-fail grades and the Coop English posttest results indicate that the system of grading and the validity of the Coop English test require further study. The need for a criterion-referenced entry and exit instrument is quite apparent.

Future Investigations Suggested By this Study

In the ongoing longitudinal program of pretest-post-test studies of remedial courses, a control group should be built into the design in order to remove sources which may invalidate statistical results.

In addition, it is important to determine how different populations are affected by the remedial course work. In view of this, additional independent variables should be introduced to sort out the student population. High

school averages will be used to trichotomize students into the following categories:

1. Regular students 75% or above
2. Level A 70%-74.9
3. Level B Below 70%

These data will then provide a basis for evaluating in part the Open Admissions program. Levels A and B will be carefully followed and compared to the "regular" student category since these two (2) categories predominantly comprise the so called "Open Admissions" student.

Additional independent variables to be included in future studies are matriculated versus non-matrics, high school averages in English and Math as well as BE-03 co-requisite placements in level 2 versus prerequisite placements.

In considering Objective 2 in the introduction regarding the need to validate the placement test instruments the following studies should be conducted:

1. A study to determine the validity of the remedial reading (BE-03) placement test procedure and a replication the following semester. Two kinds of validity studies are being planned namely,

a. A correlation between the Reading Comprehension Coop English posttest scores and achievement in English 11, to yield a predictive validity coefficient.

b. A correlation between Reading Comprehension Coop English scores and diagnostic reading scores generated by remedial reading specialists in a one-to-one test situation. This will yield a concurrent validity coefficient.

2. In considering Objective 3 in the introduction there is a need to determine whether remedial instruction in both Basic English Skills as well as Mathematics affects academic performance in regular courses. For example, how well do students who are required and take remedial Math courses (MA-00, MA-10 or MA-20) do in regular Math courses as compared to students who are required and do not take remedial Math courses.

3. Finally the data from this study will serve as a baseline for longitudinal studies to measure student performance semester by semester.

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APPENDICES

APPENDIX A: Multiple Comparison Tests on Pretests (TUKEY)

APPENDIX B: Multiple Comparison Tests on Posttests (TUKEY)

APPENDIX C: Fourfold Frequency Tables for Levels 1,2,3,&4

APPENDIX A-1

Summary of Tukey Test for Vocabulary Means - Pretest

$\tilde{n}$ = 239.52 $q_{\tilde{d}n}$ = .52 t = 1.02

	Level 1	Level 2	Level 3	Level 4
means	16.72	20.89	23.42	26.46
16.72 (Level 1)		4.17*	6.70*	9.72*
20.89 (Level 2)			2.52*	5.57*
23.42 (Level 3)				3.04*
26.46 (Level 4)				

*Significant at alpha = .05.

APPENDIX A-2

Summary of Tukey Test for Level of Comprehension Means Showing Mean Differences Between Levels (Pretest)

$\tilde{n}$ = 239.52 $q_{\tilde{d}n}$ = .347 t = .68

	Level 1	Level 2	Level 3	Level 4
means	11.68	13.30	15.21	16.34
11.68 (Level 1)		1.62*	3.53*	4.66*
13.30 (Level 2)			1.91*	3.04*
15.21 (Level 3)				1.13*
16.34 (Level 4)				

*Significant at alpha = .05.

APPENDIX A-3

Summary of Tukey Test for Speed Means - Pretest

$\tilde{n}$ = 239.52 q_{dn} = .46 t = .9

	Level 1	Level 2	Level 3	Level 4
means	13.99	16.20	19.42	22.42
13.99 (Level 1)		2.21*	5.43*	8.43*
16.20 (Level 2)			3.22*	6.22*
19.42 (Level 3)				3.00*
22.42 (Level 4)				

*Significant at alpha = .05.

APPENDIX A-4

Summary of Tukey Test for Total Reading Means Showing Mean Differences Between Levels (Pretest)

$\tilde{n}$ = 239.52 q_{dn} = 1.72 t = 3.37

	Level 1	Level 2	Level 3	Level 4
means	138.86	142.58	146.22	150.52
138.86 (Level 1)		3.73*	7.36*	11.66*
142.58 (Level 2)			3.63*	7.93*
146.22 (Level 3)				4.30*
150.52 (Level 4)				

*Significant at alpha = .05.

APPENDIX B-1

Summary of Tukey Test for Vocabulary Means - Posttest

$\tilde{n}$ = 239.52 σ_{dn} = .65 t = 1.28

	Level 1	Level 2	Level 3	Level 4
means	22.69	25.38	27.57	29.73
22.69 (Level 1)		2.69*	4.88*	7.04*
25.38 (Level 2)			2.19*	4.35*
27.57 (Level 3)				2.16*
29.73 (Level 4)				

*Significant at alpha = .05.

APPENDIX B-2

Summary of Tukey Test for Level of Comprehension Means Showing Mean Differences Between Levels(Posttest)

$\tilde{n}$ = 239.52 σ_{dn} = .38 t = .75

	Level 1	Level 2	Level 3	Level 4
means	14.05*	15.21*	17.13*	17.64*
14.05* (Level 1)		1.16*	3.08*	3.59*
15.21* (Level 2)			1.92*	2.43*
17.13* (Level 3)				.51
17.64* (Level 4)				

*Significant at alpha = .05.

APPENDIX B-3

Summary of Tukey Test for Speed Means - Posttest

$\tilde{n}$ = 239.52 σ_{dn} = .66 t = 1.29

	Level 1	Level 2	Level 3	Level 4
means	19.08	21.37	24.38	26.84
19.08 (Level 1)		2.29*	5.30*	7.76*
21.37 (Level 2)			3.01*	5.47*
24.38 (Level 3)				2.46*
26.84 (Level 4)				

*Significant at alpha = .05.

APPENDIX B-4

Summary of Tukey Test for Total Reading Means Showing Mean Differences Between Levels (Posttest)

$\tilde{n}$ = 239.52 σ_{dn} = .6 t = 1.17

	Level 1	Level 2	Level 3	Level 4
means	147.88	150.71	153.52	156.46
147.88 (Level 1)		2.83*	5.64*	8.58*
150.71 (Level 2)			2.81*	5.75*
153.52 (Level 3)				2.94*
156.46 (Level 4)				

*Significant at alpha = .05.

APPENDIX C-1

A Fourfold Table of Frequencies Comparing Posttest Placement by the Reading Comprehension Coop English Test and Final Grades for Level One (1) of BE-03 (Remedial Reading). N=156

		BE-03 Coop English Posttest Results		
		Pass	Fail	Total
BE-03 Final Grade	Pass	31 (19.9%)	73 (46.8%)	104 (66.7%)
	Fail	4 (2.6%)	48 (30.8%)	52 (33.3%)
	Total	35 (22.4%)	121 (77.6%	156 (100%)

$\chi^2 = 61.8$, df = 1, $p < .001$

APPENDIX C-2

A Fourfold Table of Frequencies Comparing Posttest Placement by the Reading Comprehension Coop English Test and Final Grades for Level Two (2) of BE-03 (Remedial Reading). N=365

		BE-03 Coop English Posttest Results		
		Pass	Fail	Total
BE-03 Final Grade	Pass	98 (26.9%)	205 (56.2%)	303 (83%)
	Fail	2 (0.5%)	60 (16.4%)	62 (17%)
	Total	100 (27.4%)	265 (72.6%)	365 (100%)

$\chi^2 = 199.08$, df = 1, $p < .001$

APPENDIX C-3

A Fourfold Table of Frequencies Comparing Posttest Placement by the Reading Comprehension Coop English Test and Final Grades for Level Three (3) of BE-03 (Remedial Reading). N=243

		BE-03 Coop English Posttest Results		
		Pass	Fail	Total
BE-03 Final Grade	Pass	124 (51%)	100 (41.2%)	224 (92.2%)
	Fail	3 (1.2%)	16 (6.6%)	19 (7.8%)
	Total	127 (52.3%)	116 (47.7%)	243 (100%)

$\chi^2 = 91.3$, df = 1, $p < .001$

APPENDIX C-4

A Fourfold Table of Frequencies Comparing Posttest Placement by the Reading Comprehension Coop English Test and Final Grades for Level Four (4) of BE-03 (Remedial Reading). N=159

		BE-03 Coop English Posttest Results		
		Pass	Fail	Total
BE-03 Final Grade	Pass	107 (67%)	51 (32%)	158 (99%)
	Fail	0 (0%)	1 (.6%)	1 (.6%)
	Total	107 (67%)	52 (32%)	159 (100%)

$\chi^2 = 51$, df = 1, $p < .001$

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APPENDIX C-5

A Fourfold Table of Frequencies Comparing Posttest Placement by the English Coop Test and Final Grades for Day Students - Mixed Reading Levels 1 to 4. (N=119)

		BE-03 Coop English Posttest Results		
		Pass	Fail	Total
	Pass	48 (40.3%)	56 (47.1%)	104 (87.4%)
BE-03 Final Grade	Fail	0 (0%)	15 (12.6%)	15 (12.6%)
	Total	48 (40.3%	71 (59.7%)	119 (100%)

$\chi^2 = 56$, df = 1, $p < .001$

APPENDIX C-6

A Fourfold Table of Frequencies Comparing Posttest Placement by the English Coop Test and Final Grades for Evening Students - Mixed Reading Levels 1 to 4 (N=244)

		BE-03 Coop English Posttest Results		
		Pass	Fail	Total
	Pass	100 (41%)	125 (51.2%)	225 (92.2%)
BE-03 Final Grade	Fail	0 (0%)	19 (7.8%)	19 (7.8%)
	Total	100 (41%)	144 (59%)	244 (100%)

$\chi^2 = 125$, df = 1, $p < .001$